

TITLE OF THE INVENTION

ELECTRICALLY SMALL PLANAR UWB ANTENNA APPARATUS AND RELATED SYSTEM

CROSS-REFERENCE TO RELATED PATENT DOCUMENTS

[001] This application is a continuation-in-part of U.S. Patent Application Serial No. 09/633,815, filed August 7, 2000, and entitled "Electrically Small Planar UWB Antenna Apparatus and System Thereof, which is related to U.S. Patent Application Serial No. 6,700,939 filed on December 11, 1998 and entitled "Ultra Wide Bandwidth Spread-Spectrum Communications System," both of which are incorporated herein by reference in their entirety.

BACKGROUND OF THE INVENTION

[002] The present invention relates generally to antenna apparatuses and systems, and more particularly, to planar antennas with non-dispersive, ultra wide bandwidth (UWB) characteristics.

[003] With respect to the antenna of radar and communications systems, there are five principle characteristics relative to the size of the antenna: the radiated pattern in-space versus frequency, the efficiency versus frequency, the input impedance versus frequency, and the dispersion. Typically, antennas operate with only a few percent bandwidth, and bandwidth is defined to be a contiguous band of frequencies in which the VSWR (voltage standing wave ratio) is below 2:1. In contrast, ultra wide bandwidth (UWB) antennas provide significantly greater bandwidth than the few percent found in conventional antennas, and exhibit low dispersion. For example, as discussed in Lee